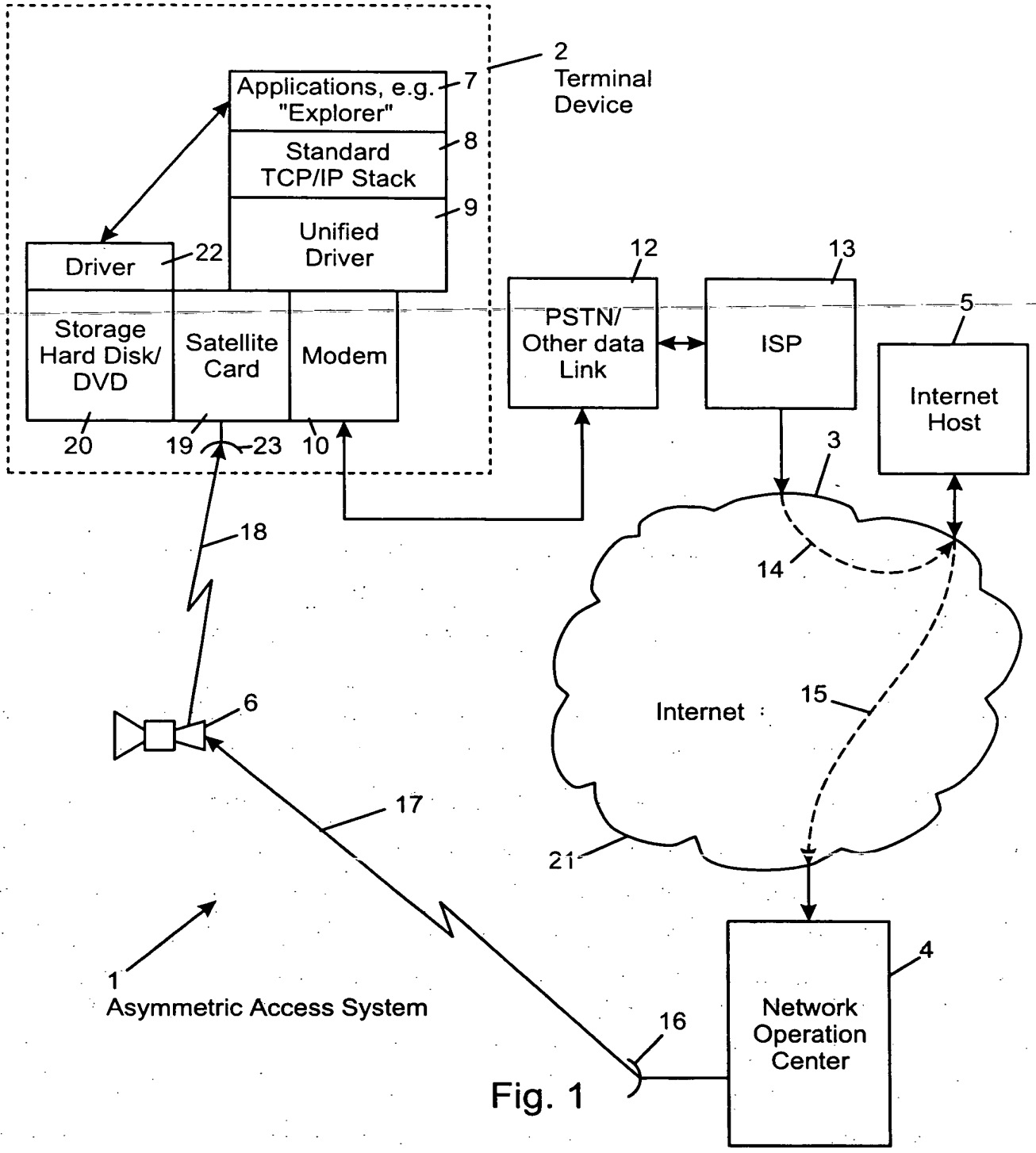

Fig. 1

Copyright © 2005 Skyfile

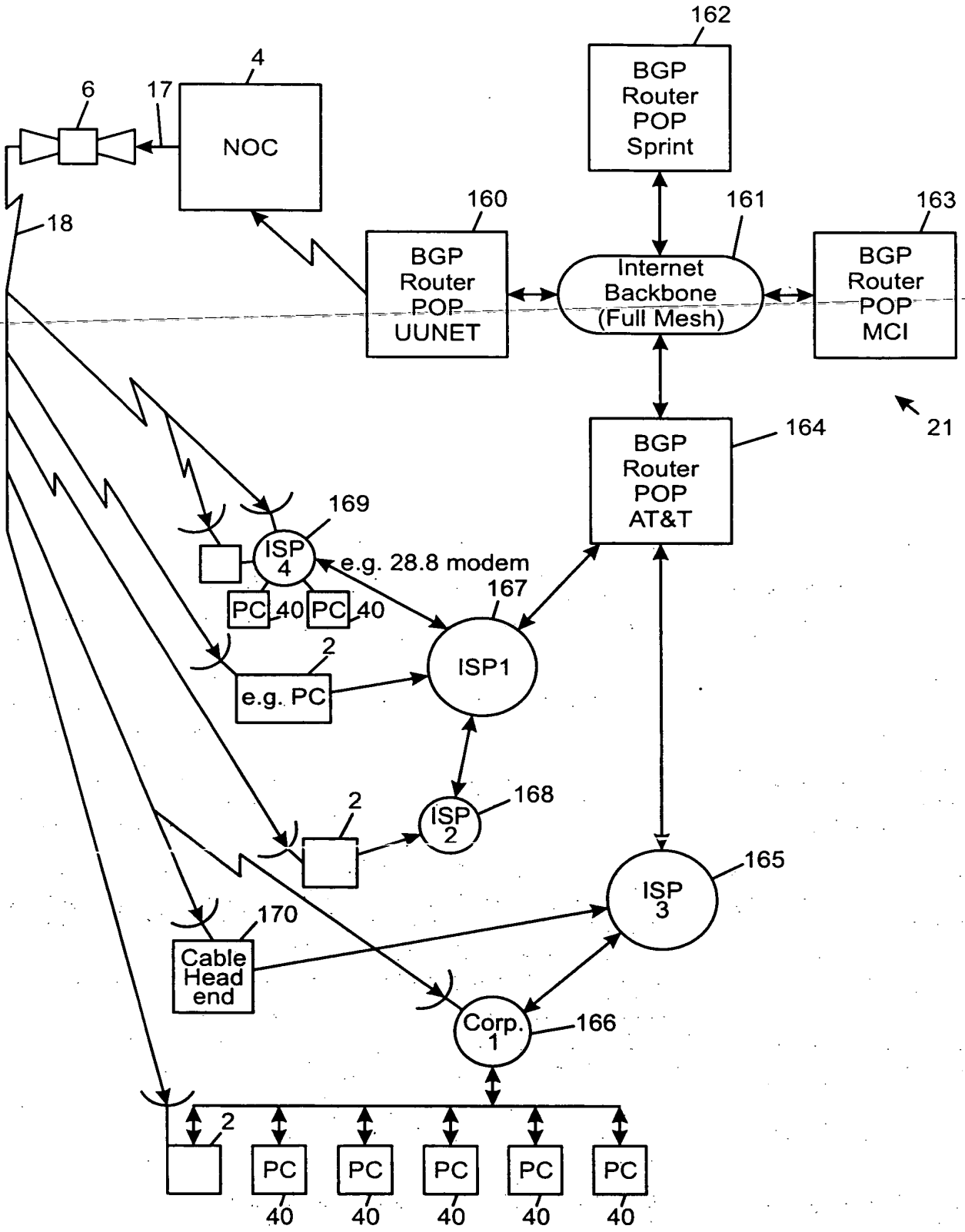
162
BGP Router POP Sprint
4
6
17
NOC
160
161
163
18
BGP Router POP UUNET
Internet Backbone (Full Mesh)
BGP Router POP MCI
21
164
BGP Router POP AT&T
169
ISP 4
e.g. 28.8 modem
167
PC 40
PC 40
2
e.g. PC
ISP1
2
168
ISP 2
165
ISP 3
170
Cable Head end
Corp. 1
166
2
PC 40
PC 40
PC 40
PC 40
PC 40

Fig. 2

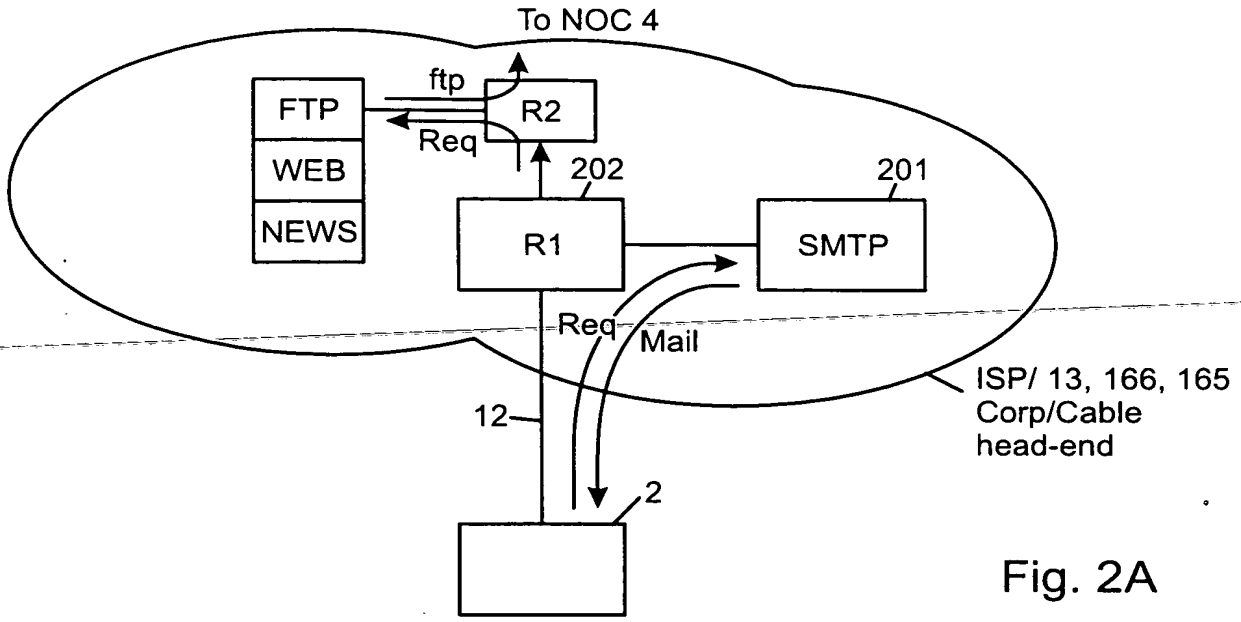
To NOC 4
ftp
FTP
R2
Req
WEB
NEWS
202
201
R1
SMTP
Req
Mail
ISP/ 13, 166, 165
Corp/Cable
head-end
12
2

Fig. 2A

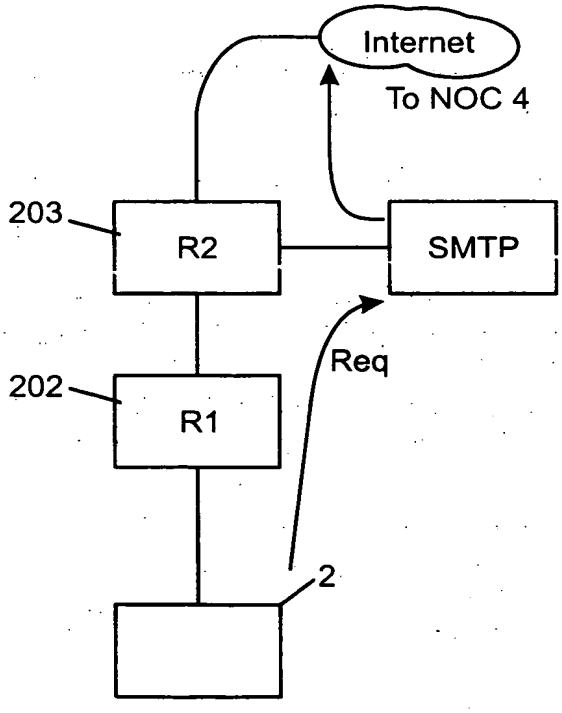
Internet
To NOC 4
203
R2
SMTP
Req
202
R1
2

Fig. 2B

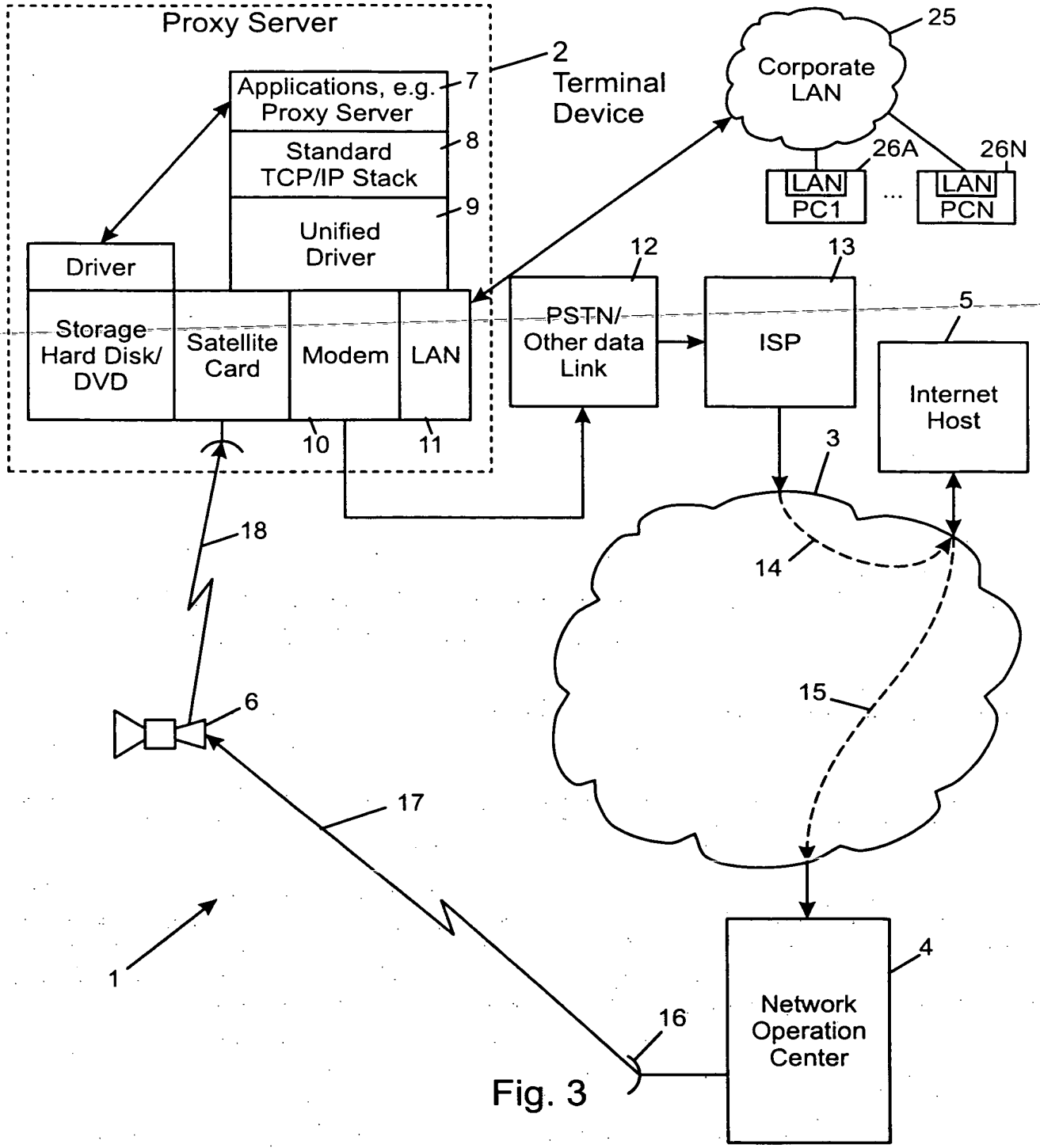
Proxy Server
2
Terminal Device
Applications, e.g. Proxy Server
7
Standard TCP/IP Stack
8
Unified Driver
9
Driver
Storage Hard Disk/ DVD
Satellite Card
Modem
LAN
10
11
12
PSTN/ Other data Link
13
ISP
5
Internet Host
3
Corporate LAN
25
26A
26N
LAN PC1
...
LAN PCN
18
14
15
6
17
1
16
Network Operation Center
4

Fig. 3

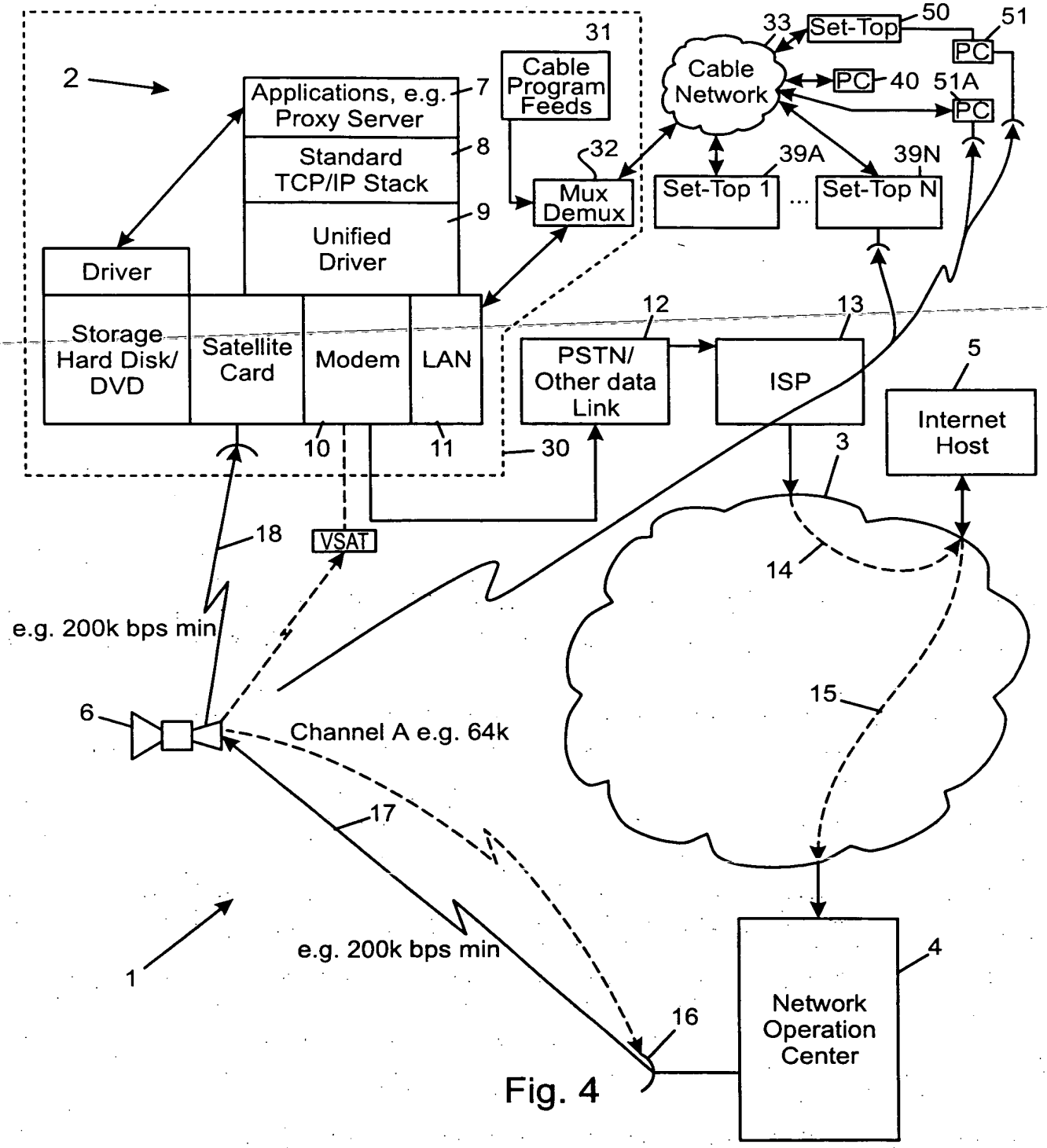
2
Applications, e.g. Proxy Server
7
Standard TCP/IP Stack
8
Unified Driver
9
Driver
Storage Hard Disk/ DVD
Satellite Card
Modem
LAN
10
11
30
31
Cable Program Feeds
32
Mux Demux
33
Set-Top
50
51
PC
Cable Network
PC
40
51A
PC
39A
39N
Set-Top 1
...
Set-Top N
12
PSTN/ Other data Link
13
ISP
5
Internet Host
3
14
15
18
VSAT
e.g. 200k bps min
6
Channel A e.g. 64k
17
e.g. 200k bps min
1
16
4
Network Operation Center

Fig. 4

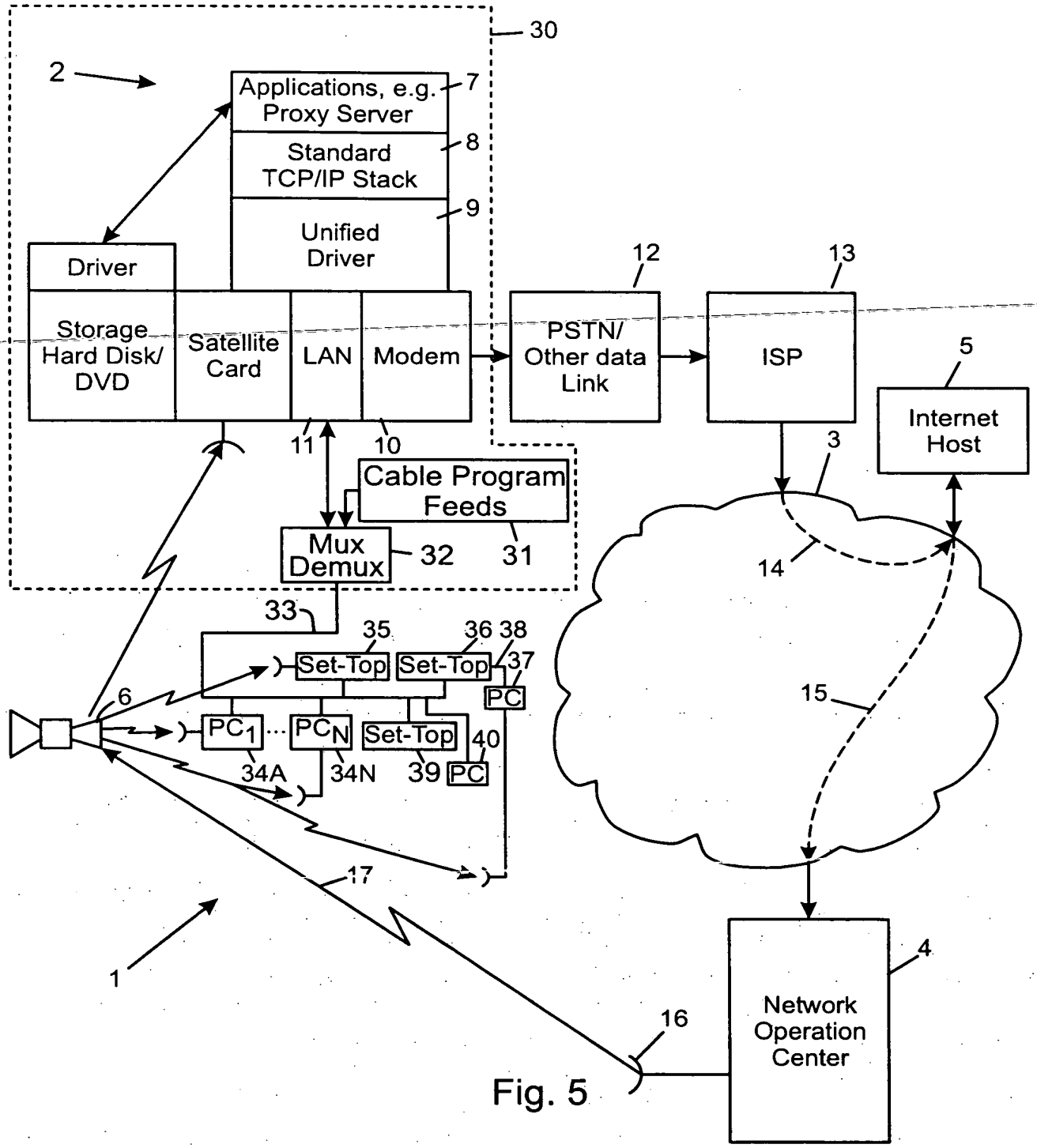
30
2
Applications, e.g. Proxy Server
7
Standard TCP/IP Stack
8
Unified Driver
9
Driver
Storage Hard Disk/ DVD
Satellite Card
LAN
Modem
12
PSTN/ Other data Link
13
ISP
5
Internet Host
3
11
10
Cable Program Feeds
31
Mux Demux
32
14
33
35
36
38
Set-Top
Set-Top
37
PC
6
PC1
PCN
Set-Top
40
34A
34N
39
PC
15
17
1
16
Network Operation Center
4

Fig. 5

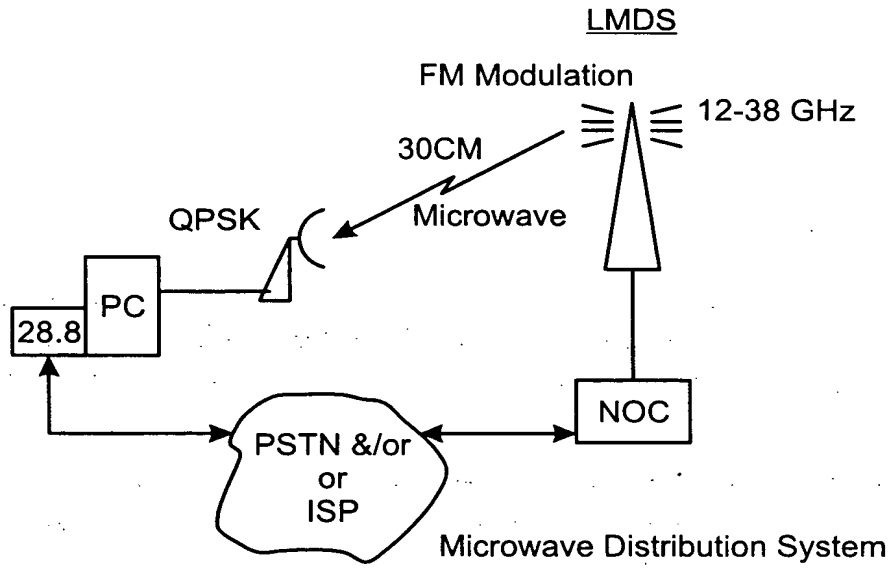

Fig. 6

DOCUMENT: 2004260

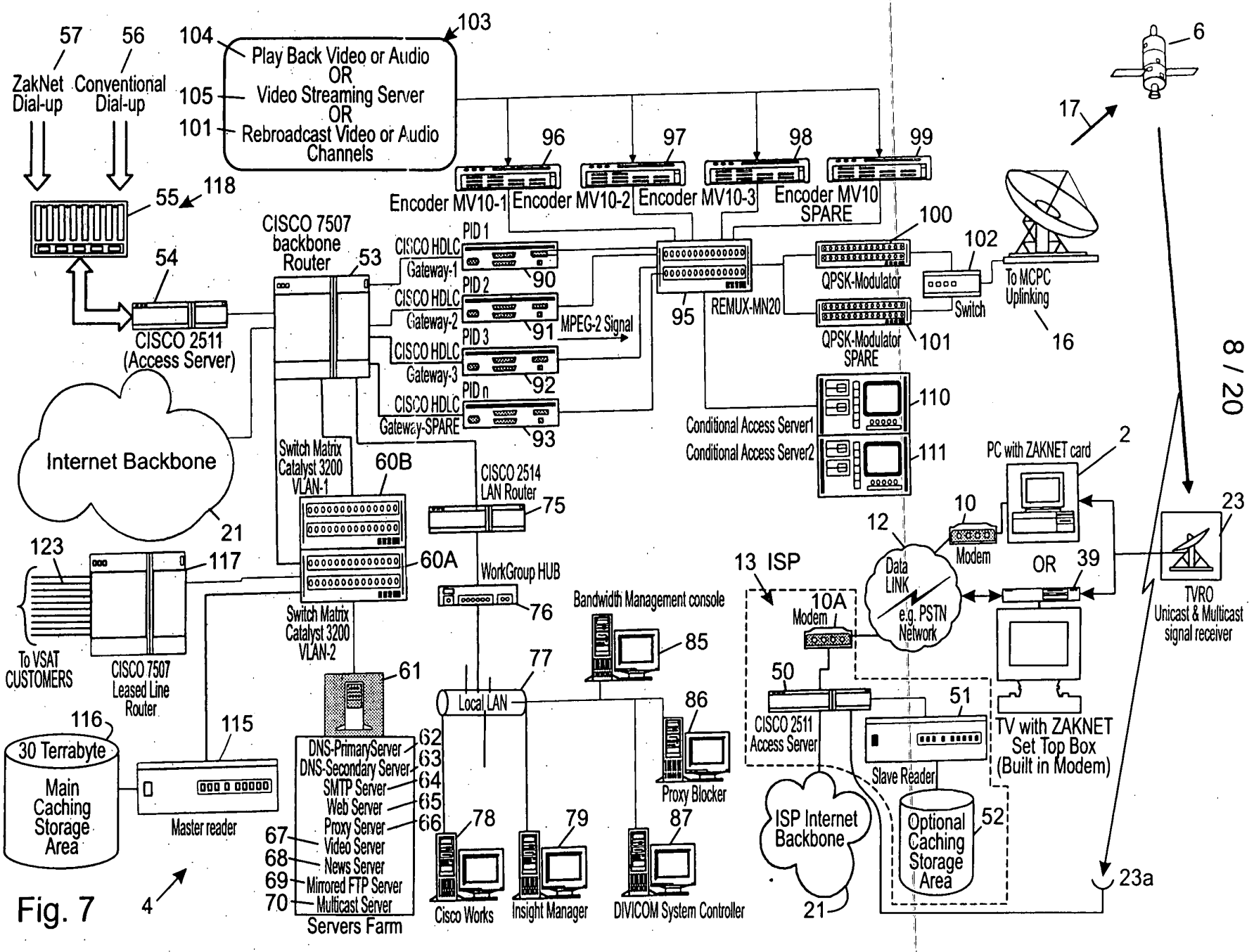
57
56
104
103
ZakNet Dial-up
Conventional Dial-up
Play Back Video or Audio
OR
105
Video Streaming Server
OR
101
Rebroadcast Video or Audio Channels
6
17
96
97
98
99
Encoder MV10-1
Encoder MV10-2
Encoder MV10-3
Encoder MV10 SPARE
118
55
100
102
CISCO 7507 backbone Router
53
PID 1
CISCO HDLC Gateway-1
90
54
PID 2
CISCO HDLC Gateway-2
91
MPEG-2 Signal
95
REMUX-MN20
QPSK-Modulator
Switch
To MCPC Uplinking
16
CISCO 2511 (Access Server)
PID 3
CISCO HDLC Gateway-3
92
QPSK-Modulator SPARE
101
PID n
CISCO HDLC Gateway-SPARE
93
110
Conditional Access Server1
Conditional Access Server2
111
Internet Backbone
21
Switch Matrix Catalyst 3200 VLAN-1
60B
CISCO 2514 LAN Router
75
PC with ZAKNET card
2
10
12
23
123
117
60A
WorkGroup HUB
76
13 ISP
Data LINK
e.g. PSTN Network
Modem
OR
39
TVRO Unicast & Multicast signal receiver
Switch Matrix Catalyst 3200 VLAN-2
Bandwidth Management console
85
10A
Modem
To VSAT CUSTOMERS
CISCO 7507 Leased Line Router
61
77
Local LAN
50
51
86
116
115
CISCO 2511 Access Server
TV with ZAKNET Set Top Box (Built in Modem)
30 Terrabyte
Main Caching Storage Area
Master reader
62
DNS-PrimaryServer
63
DNS-Secondary Server
64
SMTP Server
65
Web Server
66
Proxy Server
Slave Reader
Proxy Blocker
67
Video Server
68
News Server
69
Mirrored FTP Server
70
Multicast Server
78
79
87
ISP Internet Backbone
Optional Caching Storage Area
52
Servers Farm
Cisco Works
Insight Manager
DIVICOM System Controller
21
23a
4

Fig. 7

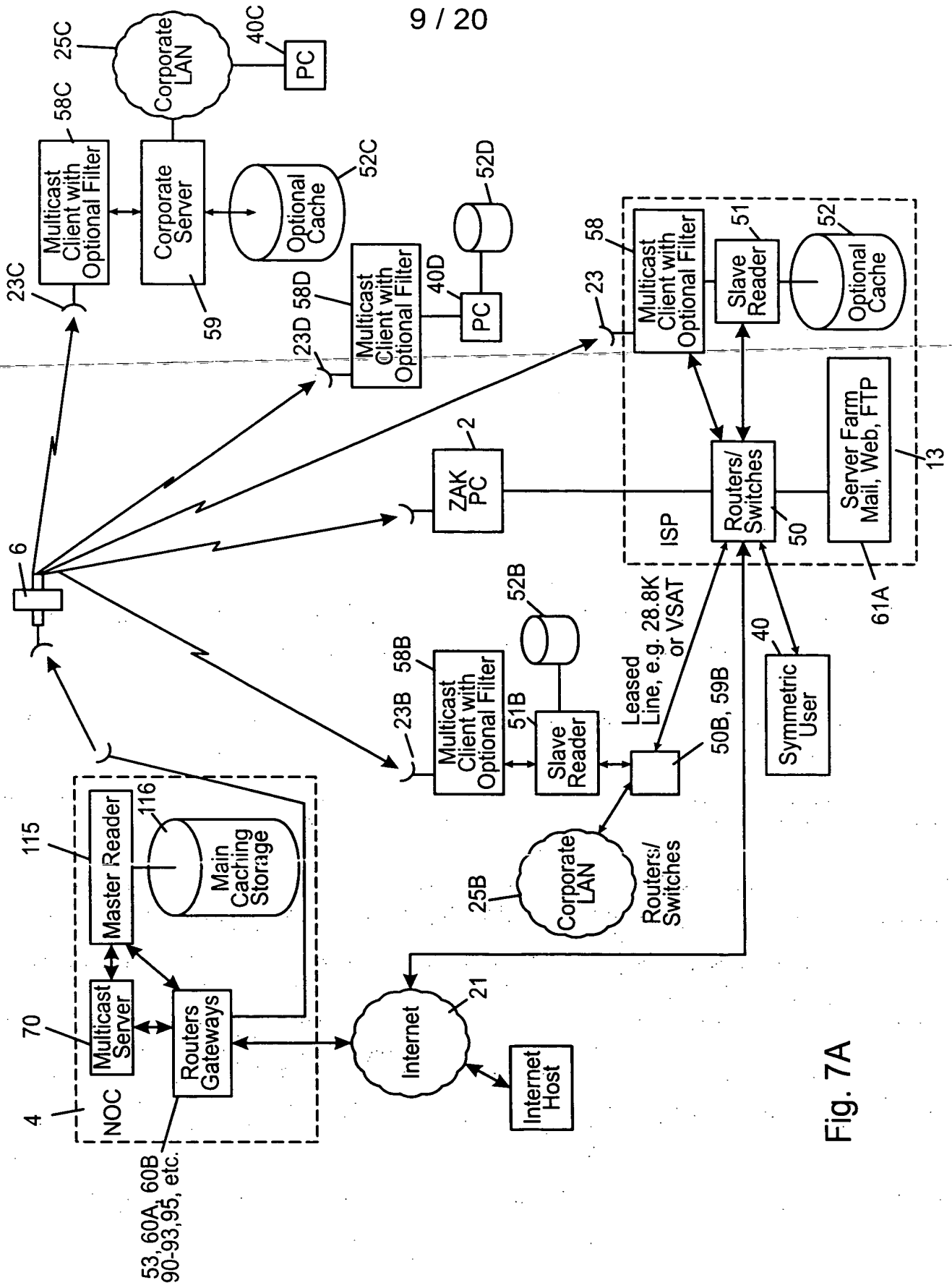
NOC
4
Multicast Server
70
Master Reader
115
Main Caching Storage
116
Routers Gateways
53, 60A, 60B 90-93,95, etc.
Internet
21
Internet Host
6
23C
Multicast Client with Optional Filter
58C
Corporate Server
59
Corporate LAN
25C
PC
40C
Optional Cache
52C
23D
Multicast Client with Optional Filter
58D
PC
40D
52D
ZAK PC
2
23B
Multicast Client with Optional Filter
58B
Slave Reader
51B
52B
Corporate LAN
25B
Routers/ Switches
50B, 59B
Leased Line, e.g. 28.8K or VSAT
Symmetric User
40
23
Multicast Client with Optional Filter
58
Slave Reader
51
Optional Cache
52
ISP
Routers/ Switches
50
Server Farm Mail, Web, FTP
13
61A

Fig. 7A

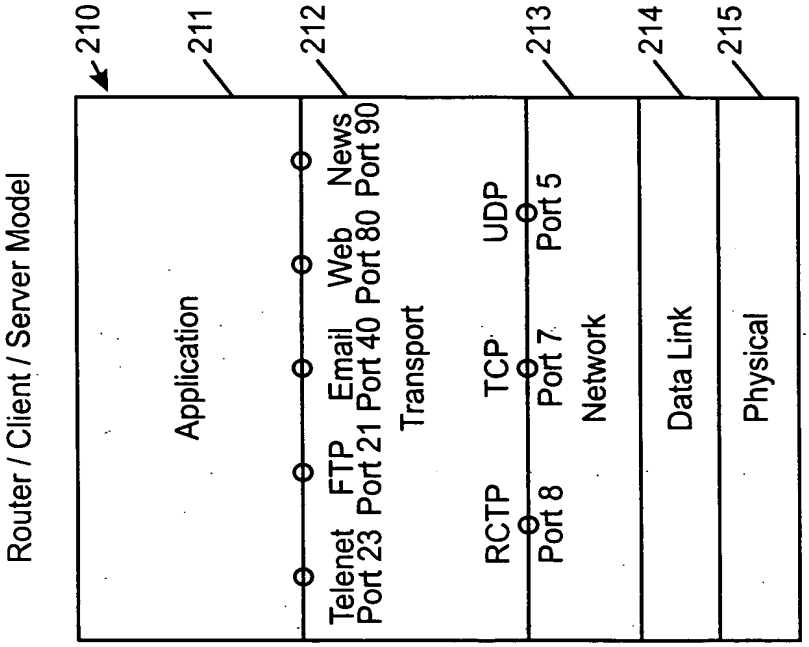
TCP/IP
Router / Client / Server Model
210
211
212
213
214
215
Application
Telenet Port 23
FTP Port 21
Email Port 40
Web Port 80
News Port 90
Transport
RCTP Port 8
TCP Port 7
UDP Port 5
Network
Data Link
Physical

Fig. 7B

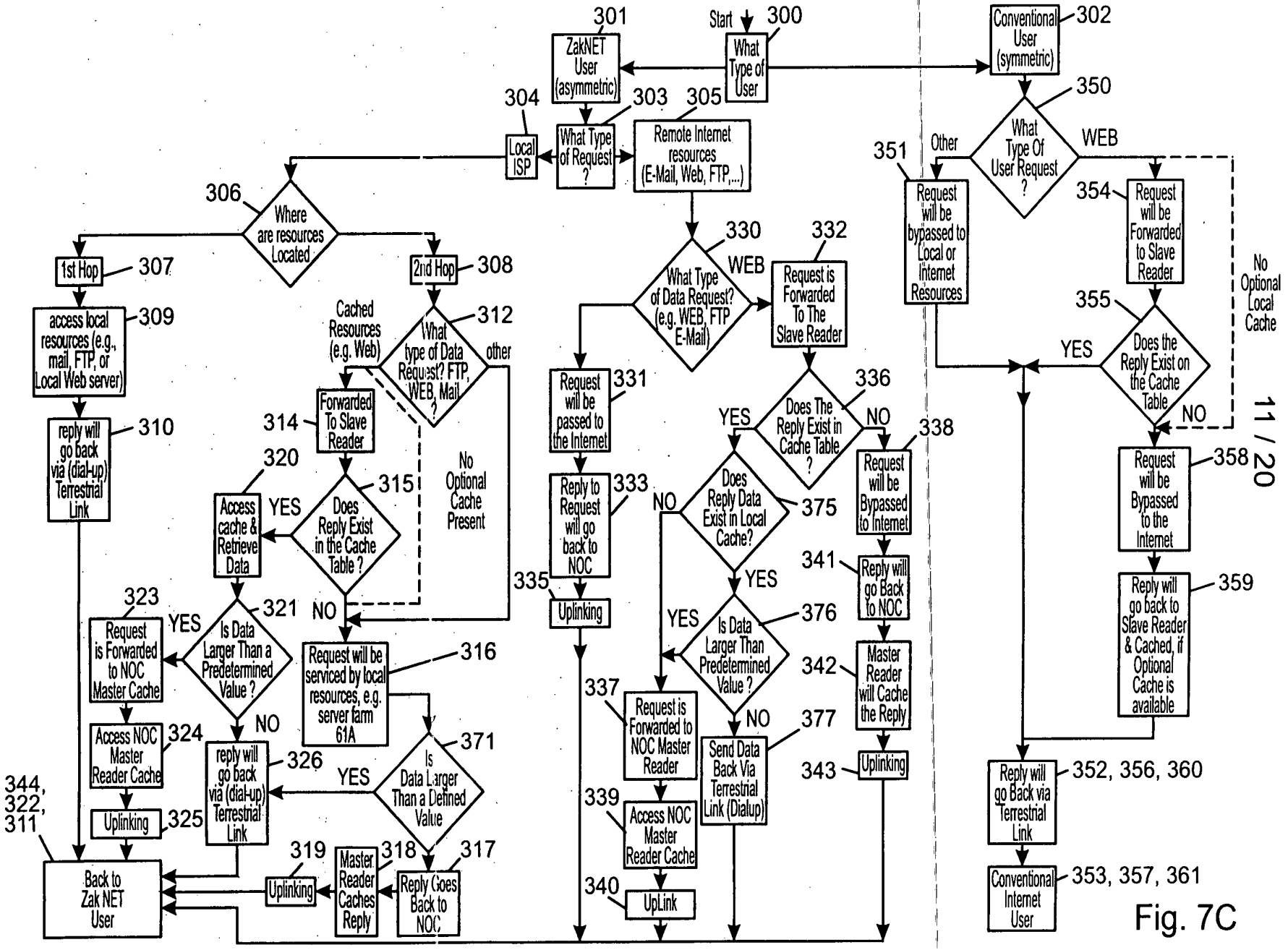
Start
300
What Type of User
301
ZakNET User (asymmetric)
302
Conventional User (symmetric)
303
What Type of Request ?
304
Local ISP
305
Remote Internet resources (E-Mail, Web, FTP,...)
306
Where are resources Located
307
1st Hop
308
2nd Hop
309
access local resources (e.g., mail, FTP, or Local Web server)
310
reply will go back via (dial-up) Terrestrial Link
312
What type of Data Request? FTP, WEB, Mail ?
Cached Resources (e.g. Web)
other
314
Forwarded To Slave Reader
315
Does Reply Exist in the Cache Table ?
No Optional Cache Present
320
Access cache & Retrieve Data
321
Is Data Larger Than a Predetermined Value ?
323
Request is Forwarded to NOC Master Cache
324
Access NOC Master Reader Cache
325
Uplinking
326
reply will go back via (dial-up) Terrestrial Link
316
Request will be serviced by local resources, e.g. server farm 61A
371
Is Data Larger Than a Defined Value
317
Reply Goes Back to NOC
318
Master Reader Caches Reply
319
Uplinking
344, 322, 311
Back to Zak NET User
330
What Type of Data Request? (e.g. WEB, FTP E-Mail)
WEB
331
Request will be passed to the Internet
333
Reply to Request will go back to NOC
335
Uplinking
332
Request is Forwarded To The Slave Reader
336
Does The Reply Exist in Cache Table ?
338
Request will be Bypassed to Internet
341
Reply will go Back to NOC
342
Master Reader will Cache the Reply
343
Uplinking
375
Does Reply Data Exist in Local Cache?
376
Is Data Larger Than Predetermined Value ?
377
Send Data Back Via Terrestrial Link (Dialup)
337
Request is Forwarded to NOC Master Reader
339
Access NOC Master Reader Cache
340
UpLink
350
What Type Of User Request ?
Other
351
Request will be bypassed to Local or Internet Resources
WEB
354
Request will be Forwarded to Slave Reader
355
Does the Reply Exist on the Cache Table
YES
NO
No Optional Local Cache
358
Request will be Bypassed to the Internet
359
Reply will go back to Slave Reader & Cached, if Optional Cache is available
352, 356, 360
Reply will go Back via Terrestrial Link
353, 357, 361
Conventional Internet User

Fig. 7C

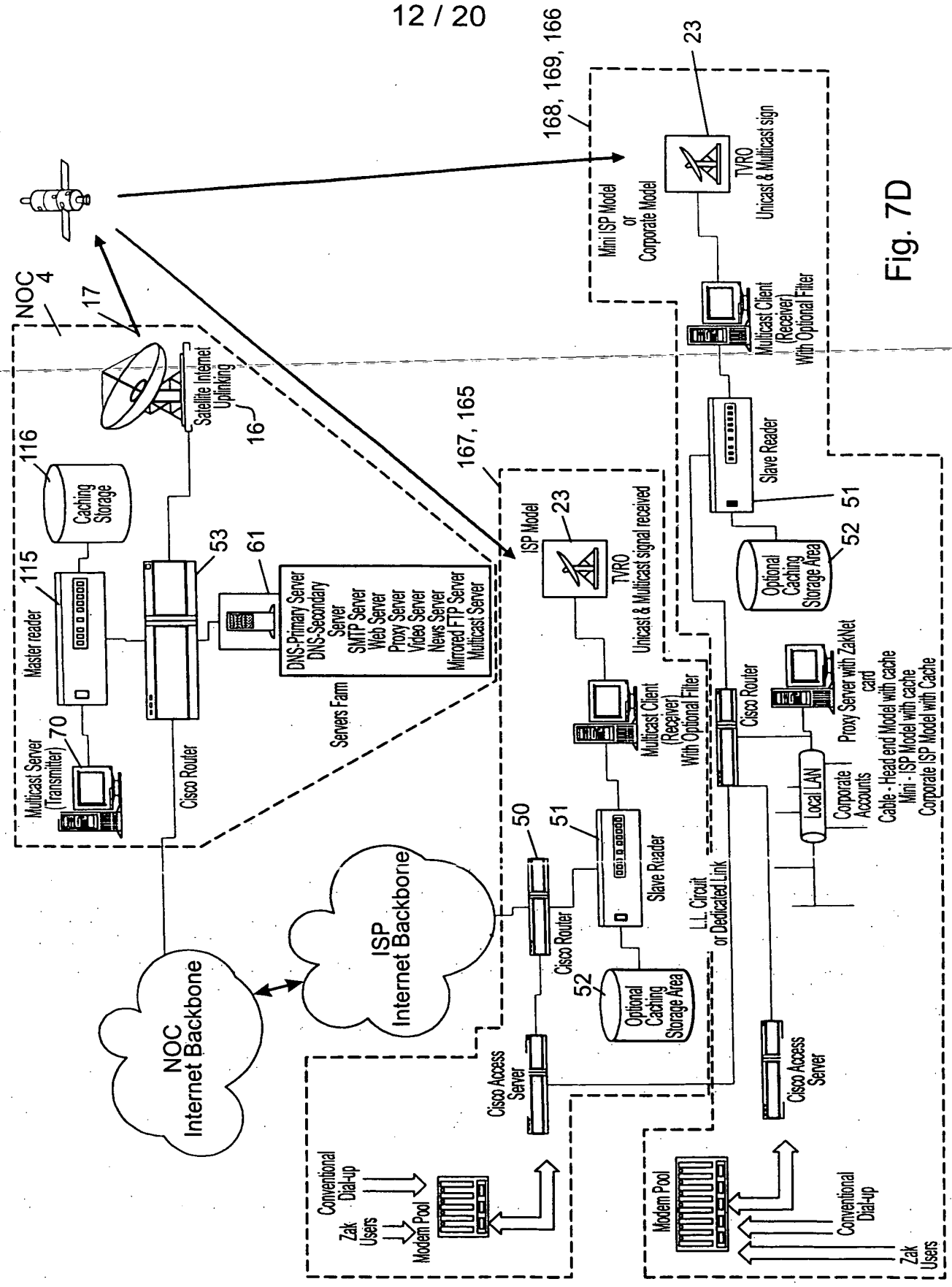
NOC
4
17
Satellite Internet Uplinking
16
116
Caching Storage
115
Master reader
53
61
DNS-Primary Server
DNS-Secondary Server
SMTP Server
Web Server
Proxy Server
Video Server
News Server
Mirrored FTP Server
Multicast Server
Servers Farm
Multicast Server (Transmitter)
70
Cisco Router
NOC Internet Backbone
ISP Internet Backbone
167, 165
ISP Model
23
TVRO
Unicast & Multicast signal received
Multicast Client (Receiver) With Optional Filter
50
51
Cisco Router
Slave Reader
52
Optional Caching Storage Area
L.L. Circuit or Dedicated Link
Cisco Access Server
Conventional Dial-up
Zak Users
Modem Pool
168, 169, 166
Mini ISP Model or Corporate Model
23
TVRO
Unicast & Multicast sign
Multicast Client (Receiver) With Optional Filter
Slave Reader
51
52
Optional Caching Storage Area
Cisco Router
Proxy Server with ZakNet card
Local LAN
Corporate Accounts
Cable - Head end Model with cache
Mini - ISP Model with cache
Corporate ISP Model with Cache
Cisco Access Server
Modem Pool
Conventional Dial-up
Zak Users

Fig. 7D

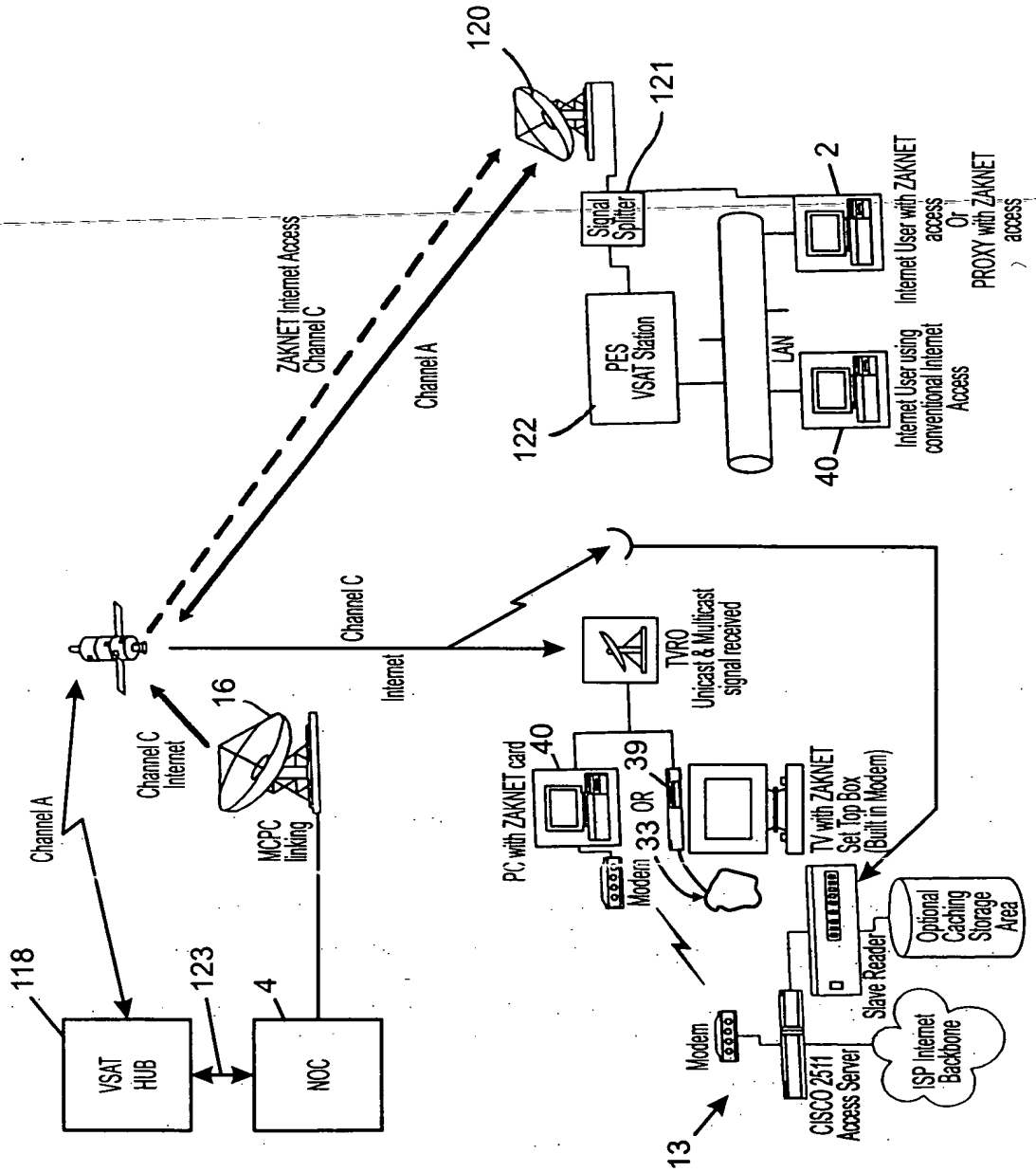
120
121
ZAKNET Internet Access
Channel C
Channel A
Signal Splitter
2
Internet User with ZAKNET access Or PROXY with ZAKNET access
PES VSAT Station
LAN
122
Internet User using conventional Internet Access
40
Channel A
Channel C Internet
16
Channel C
Internet
TVRO
Unicast & Multicast signal received
MCPC linking
PC with ZAKNET card
40
39
33 OR
TV with ZAKNET Set Top Box (Built in Modem)
Modem
Optional Caching Storage Area
118
123
4
VSAT HUB
NOC
Modem
Slave Reader
ISP Internet Backbone
CISCO 2511 Access Server
13

Fig. 8

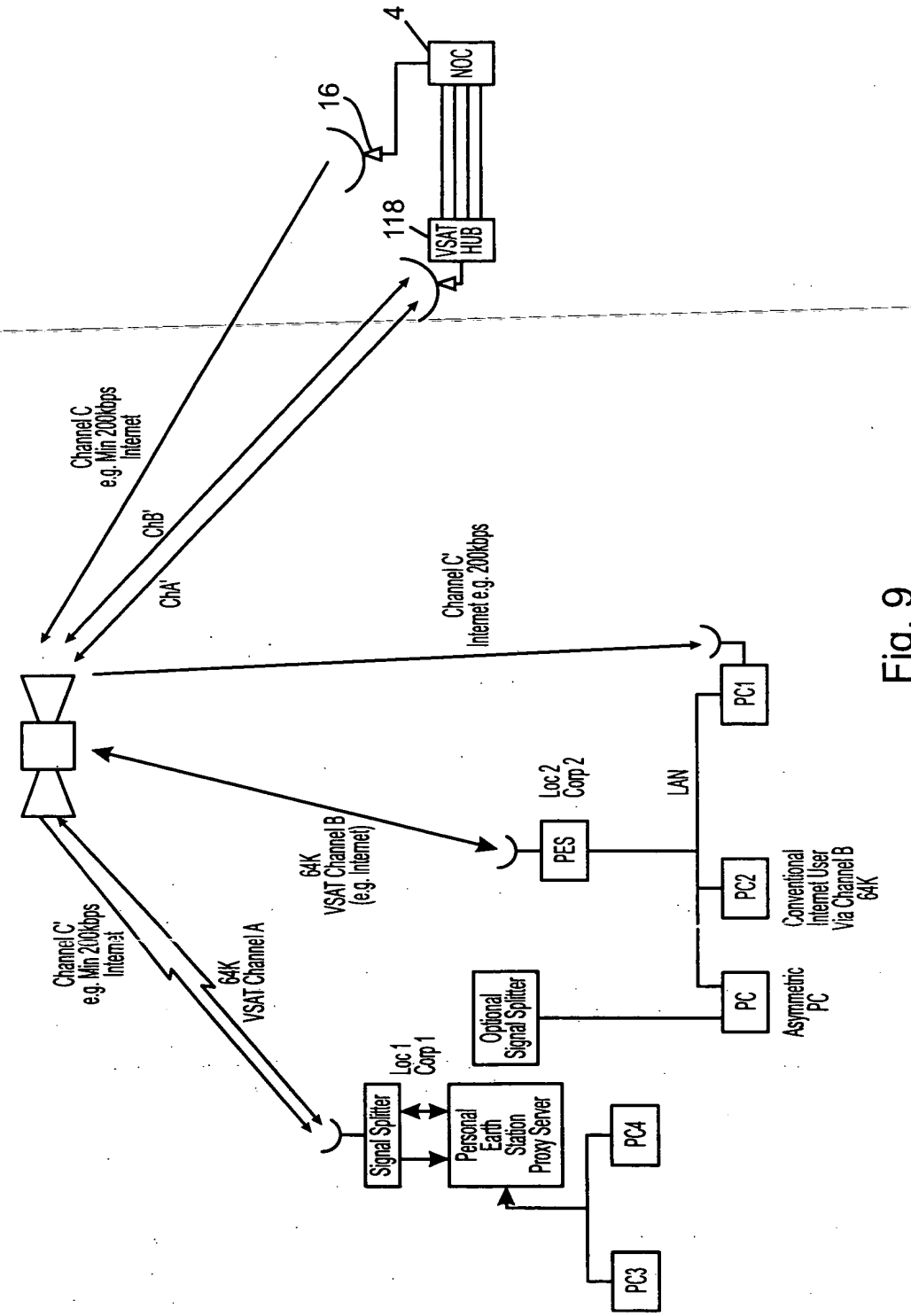
4
NOC
16
118
VSAT HUB
Channel C
e.g. Min 200kbps
Internet
ChB'
ChA'
Channel C'
Internet e.g. 200kbps
Channel C'
e.g. Min 200kbps
Internet
64K
VSAT Channel A
64K
VSAT Channel B
(e.g. Internet)
Loc 2
Comp 2
PES
LAN
PC1
PC2
Conventional
Internet User
Via Channel B
64K
PC
Asymmetric
PC
Optional
Signal Splitter
Loc 1
Comp 1
Signal Splitter
Personal
Earth
Station
Proxy Server
PC4
PC3

Fig. 9

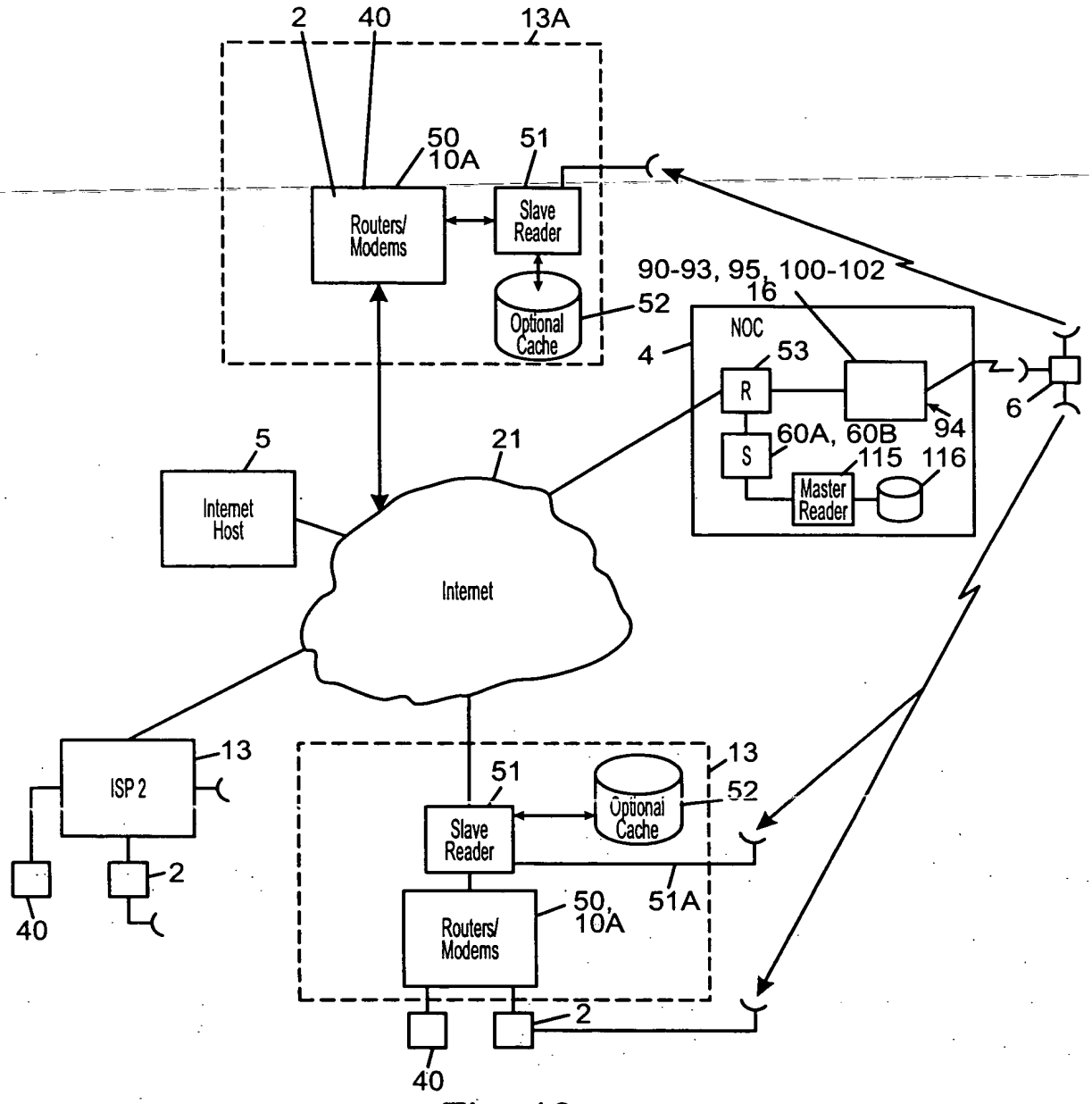
2
40
13A
50
10A
51
Routers/
Modems
Slave
Reader
Optional
Cache
52
90-93, 95, 100-102
16
NOC
4
53
R
S
60A, 60B
94
115
116
Master
Reader
6
5
Internet
Host
21
Internet
ISP 2
13
2
40
51
Slave
Reader
Optional
Cache
52
13
50,
10A
51A
Routers/
Modems
2
40

Fig. 10

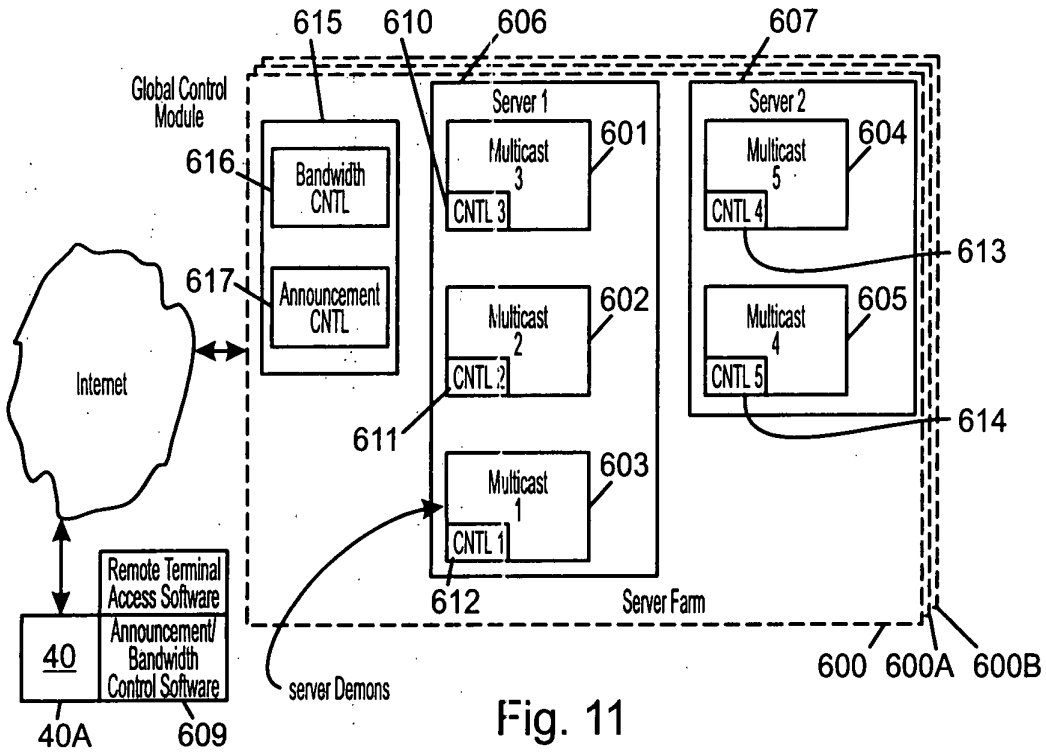

Fig. 11

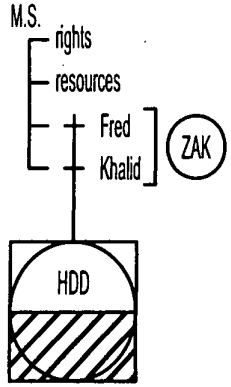

Fig. 12

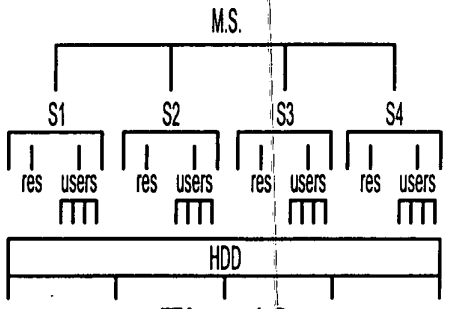

Fig. 13

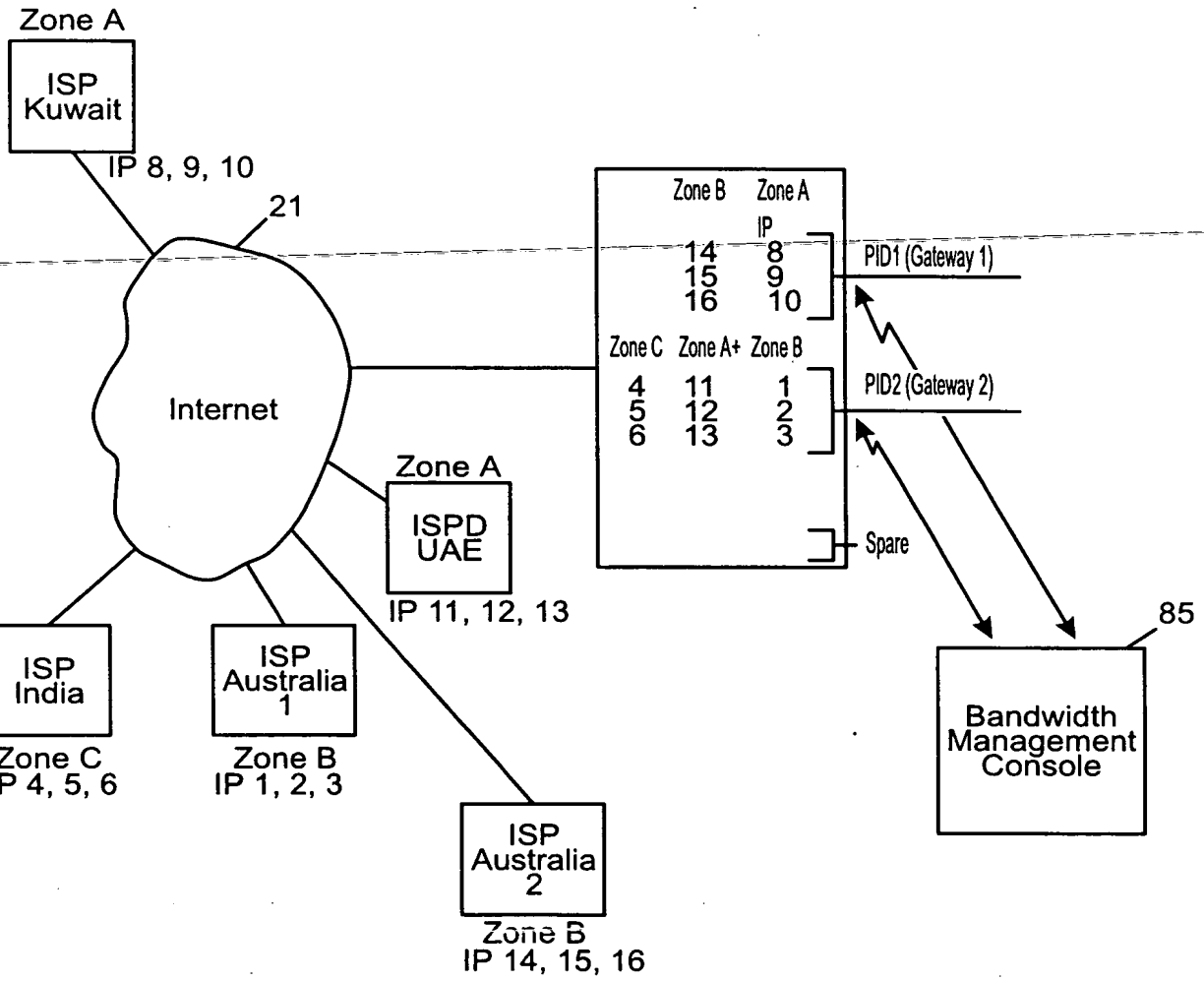
Zone A
ISP Kuwait
IP 8, 9, 10
21
Internet
Zone A
ISPD UAE
IP 11, 12, 13
ISP India
Zone C
IP 4, 5, 6
ISP Australia 1
Zone B
IP 1, 2, 3
ISP Australia 2
Zone B
IP 14, 15, 16
Zone B
Zone A
IP
14 8
15 9
16 10
PID1 (Gateway 1)
Zone C
Zone A+
Zone B
4 11 1
5 12 2
6 13 3
PID2 (Gateway 2)
Spare
85
Bandwidth Management Console

Fig. 14

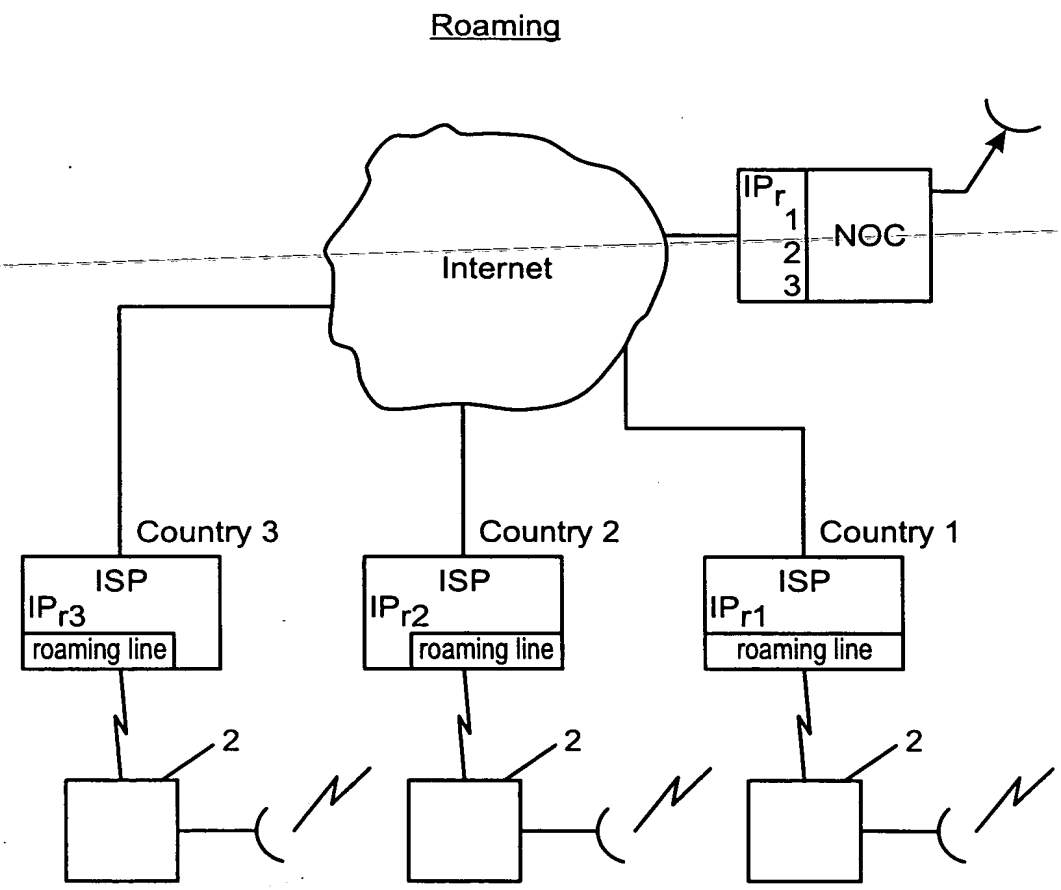
Roaming
Internet
IPr
1
2
3
NOC
Country 3
Country 2
Country 1
ISP
IPr3
roaming line
ISP
IPr2
roaming line
ISP
IPr1
roaming line
2
2
2

Fig. 15

ZAKSAT

4.0 Billing system diagram

User address 258879904783182

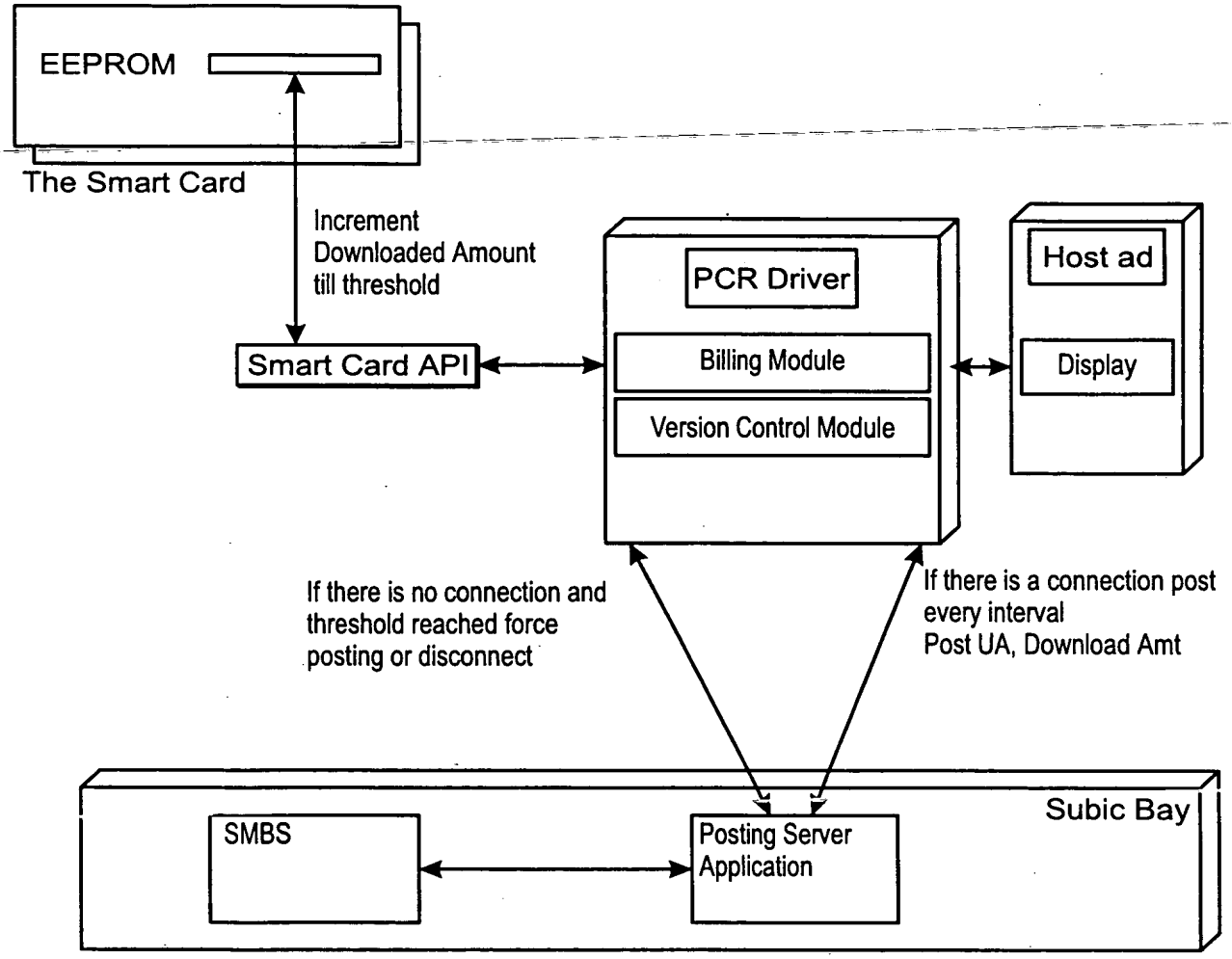

Fig. 16

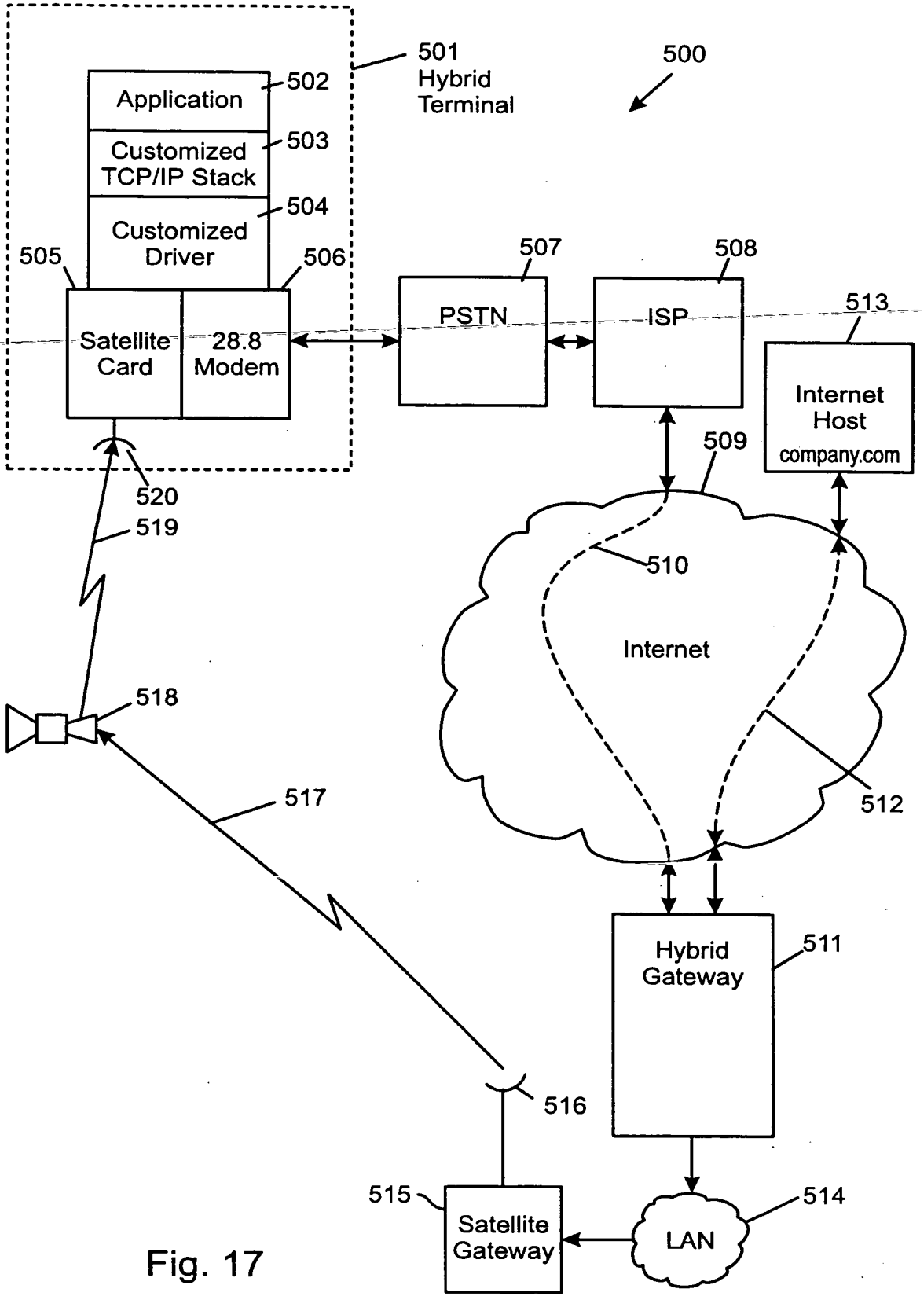
501
Hybrid
Terminal
500
Application
502
Customized
TCP/IP Stack
503
Customized
Driver
504
505
506
Satellite
Card
28.8
Modem
507
PSTN
508
ISP
513
Internet
Host
company.com
509
520
519
510
Internet
518
517
512
Hybrid
Gateway
511
516
515
Satellite
Gateway
LAN
514

Fig. 17